



## **Vitamin D3 in plants** effect of UVB exposure

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## Poster: Vitamin D<sub>3</sub> in plants – effect of UVB exposure

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**Introduction:** As a surprise for many not only vitamin D<sub>2</sub>, but also vitamin D<sub>3</sub> can be found in plants. Vitamin D<sub>3</sub> is formed in the skin of vertebrates by exposure to UVB light (Fig. 1). The synthesis of vitamin D<sub>3</sub> in plants is on the other hand unresolved and contradicting results regarding the dependence of UVB-light has been presented (1,2,3). The aim of this study was, therefore, to investigate vitamin D<sub>3</sub> synthesis and metabolism in plants and how it changes upon UVB-exposure. Most work on vitamin D<sub>3</sub> in plants has been done with non-selective methods such as bioassays, but this study utilizes LC-MS/MS with derivatization to improve sensitivity and selectivity.

**Material:** Plants were grown in growth chambers with or without UVB light. Three *Solanaceous* species were used: *Solanum glaucophyllum* Desf. (waxy leaf nightshade), *Solanum lycopersicum* L. (tomato) and *Capsicum annuum* L. (pepper).

**Method:** The leaves were harvested, freeze-dried and saponified over-night. The vitamin D<sub>3</sub> metabolites were extracted from the non-saponified matter followed by solid phase clean-up. Further clean-up was performed with semi-preparative HPLC. Fractions of vitamin D<sub>3</sub>, 25-hydroxy vitamin D<sub>3</sub> and 1,25-dihydroxy vitamin D<sub>3</sub> were collected separately and derivatized with 4-Phenyl-1,2,4-triazoline-3,5-dione (PTAD) to increase sensitivity (Fig. 2). The derivatized extracts were subsequently analyzed by LC-ESI-MS/MS. The vitamin D<sub>3</sub> metabolites were quantified using their deuterated form as internal standard.

**Results:** Vitamin D<sub>3</sub> was identified in *S. glaucophyllum*, *S. lycopersicum* and *C. annuum* (1.7-200 ng/g dry wt.). The vitamin D<sub>3</sub> content in the UVB-exposed plants was 18-64 times higher than for the not UVB-exposed plants. 25-hydroxy vitamin D<sub>3</sub> was only identified in the UVB-exposed plants (0.5-31 ng/g dry wt.), whereas 1,25-dihydroxy vitamin D<sub>3</sub> only was found in UVB-exposed *S. glaucophyllum* (32 ng/g dry wt.).

**Conclusion:** It is remarkable that the leaves of the *Solanaceous* family contain high amounts of vitamin D<sub>3</sub> bearing in mind that the fruits from, e.g. tomato is an important food for humans. Thus, the potential of plants as a vitamin D<sub>3</sub> source exists. This study demonstrates that both UVB-dependent and independent pathways for biosynthesis of vitamin D<sub>3</sub> exist in plants.

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